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For: Method for Automatically Tracking Objects in Augmented Reality

- 1 1. A method for automatically tracking an object to keep the object in the field of view of a
2 video camera, and create an augmented reality display comprising the image from the video
3 camera combined with computer-generated graphics to create an augmented reality display, the
4 method comprising:
 - 5 resolving the camera's field of view;
 - 6 determining the location of an object to be tracked relative to the camera's field of view;
 - 7 in response to the determined location of the object, moving the camera to maintain the
8 object in the camera's field of view;
 - 9 using a computer to generate a graphical image representing unseen information that
10 corresponds to the camera's viewpoint; and
 - 11 augmenting the video image with the graphical image, to create an augmented-reality image
12 having the tracked object therein, for presentation to a user.
- 1 2. The method of claim 1 wherein the augmenting step comprises using onboard video
2 mixing through use of a video capture device with the computer.
- 1 3. The method of claim 1 wherein the augmenting step comprises using an external video
2 mixing solution, to combine real and computer-generated graphical elements outside of the
3 computer.
- 1 4. The method of claim 1 for use in operations.
- 1 5. The method of claim 1 for use in training.
- 1 6. The method of claim 1 in which moving the camera comprises providing a motorized camera
2 mount for the camera, and controlling the camera mount.
- 1 7. The method of claim 6 in which the resolving step comprises calibrating the camera and
2 camera mount.
- 1 8. The method of claim 6 in which the camera mount is coupled to a fixed platform.

- 1 9. The method of claim 6 in which the resolving step comprises using the camera and
2 camera mount in conjunction with a separate camera position tracking system to generate a
3 combined position and orientation value.
- 1 10. The method of claim 6 in which the computer controls the camera mount, and the
2 resolving step comprises using the computer to resolve the field of view based on the current
3 camera position received by the computer from the camera, to accomplish a feedback control
4 system.
- 1 11. The method of claim 6 in which the computer controls the camera mount, and the
2 resolving step comprises using the computer to position the camera in a feed-forward control
3 system.
- 1 12. The method of claim 6 in which the camera mount is not stationary.
- 1 13. The method of claim 12 in which the camera mount is attached to a vehicle.
- 1 14. The method of claim 12 in which the camera mount is attached to an aircraft.
- 1 15. The method of claim 12 in which the camera mount is attached to a watercraft or ship.
- 1 16. The method of claim 12 in which the camera mount is attached to a gimbaled arm.
- 1 17. The method of claim 6 in which the resolving step comprises the motorized camera
2 mount reporting the field of view of the camera to the computer.
- 1 18. A method for automatically tracking an object to keep the object in the field of view of a
2 video camera, and create an augmented reality display comprising the image from the video
3 camera combined with computer-generated graphics to create an augmented reality display, the
4 method comprising:
5 providing a motorized camera mount for the camera;
6 resolving the camera's field of view;
7 determining the location of an object to be tracked relative to the camera's field of view;
8 in response to the determined location of the object, moving the camera to maintain the
9 object in the camera's field of view;

10 using a computer to generate a graphical image representing unseen information that
11 corresponds to the camera's viewpoint;
12 using the computer to control the camera's viewpoint; and
13 using a video capture device along with the computer to accomplish video mixing that
14 augments the video image with the graphical image, to create an augmented-reality image
15 having the tracked object therein, for presentation to a user.